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that such a vigorous plant may produce more vigorous mycelium and spore-groups, *i. e.*, may disseminate more of the disease producing fungus in a given period."—A neatly printed pamphlet of seventy-five pages, entitled Houghton Farm Experiments with Indian corn, has been published by Mr. Lawson Valentine, the proprietor of the farm at Montainville, N. Y. Dr. Miles' paper on Field Experiments, which occupies more than two-thirds of the pamphlet, contains much valuable matter botanically as well as agriculturally.

ZOÖLOGY.

THE BITE OF THE GILA MONSTER (*HELODERMA SUSPECTUM*).—Within the last week the Smithsonian Institution has received from Acting Assistant Surgeon A. T. Burr, U.S.A., now serving in Arizona, a very fine living specimen of this lizard. I understand that Dr. Burr has had this reptile in his care for nearly six months, and it arrived here in an excellent state of health.

Heloderma suspectum Cope is the largest of our North American lizards, and is found all through New Mexico, Arizona, Lower California, and the country to the southward. I have never had the pleasure of seeing this reptile in its native haunts, but have been told by those who have been so fortunate, that it is a wonderfully striking object to behold, as well we might imagine it to be, with its shining and flinty armor of jet-black and brilliant orange, irregularly arranged over its body, darting as it does among the rocks of that arid land.

The superstitious Indians, and still more superstitious Mexicans that reside in the country where the *Heloderma* is found, have always regarded it with dread and fear, attributing to its bite the direst venom. Enlightened folk have entertained in their minds doubts upon this subject, indeed I have seen specimens forwarded to the Smithsonian, by collectors from the above localities, completely perforated by a large carbine ball, so careful have they been not to handle this creature alive. In view of these facts then, and this interesting part of its natural history, well authenticated cases of bites of this lizard possess sufficient value for scientific record.

Dr. Burr's specimen is not the first representative of *Heloderma* that we have received from our vast Southwest, for from time to time quite a number of these lizards have been sent to us alive, and they thrive quite well for a long time, feeding on eggs served to them either raw or hard boiled.

In removing them from cage to cage, or handling them for other purposes, the utmost care has usually been exercised, due to their doubtful reputation and not over gentle appearance. Mr. Henry Horan, the superintendent of the National Museum, received on several occasions slight bites from these specimens, but the wounds were never followed by any untoward symptoms.

On the 18th inst., in the company of Professor Gill of the institution, I examined for the first time Dr. Burr's specimen, then in a cage in the herpetological room. It was in capital health, and at first I handled it with great care, holding it in my left hand examining special parts with my right. At the close of this examination I was about to return the fellow to his temporary quarters, when my left hand slipped slightly, and the now highly indignant and irritated *Heloderma* made a dart forward and seized my right thumb in his mouth, inflicting a severe lacerated wound, sinking the teeth in his upper maxilla to the very bone. He loosed his hold immediately and I replaced him in his cage, with far greater haste, perhaps, than I removed him from it.

By suction with my mouth, I drew not a little blood from the wound, but the bleeding soon ceased entirely, to be followed in a few moments by very severe shooting pains up my arm and down the corresponding side. The severity of these pains was so unexpected that added to the nervous shock already experienced, no doubt, and a rapid swelling of the parts that now set in, caused me to become so faint as to fall, and Dr. Gill's study was reached with no little difficulty. The action of the skin was greatly increased and the perspiration flowed profusely. A small quantity of whisky was administered. This is about a fair statement of the immediate symptoms; the same night the pain allowed of no rest, although the hand was kept in ice and laudanum, but the swelling was confined to this member alone, not passing beyond the wrist. Next morning this was considerably reduced, and further reduction was assisted by the use of a lead water wash.

In a few days the wound healed kindly, and in all probability will leave no scar; all other symptoms subsided without treatment, beyond the wearing for about forty-eight hours, so much of a kid glove as covered the parts involved.

After the bite our specimen was dull and sluggish, simulating the torpidity of the venomous serpent after it has inflicted its deadly wound, but it soon resumed its usual action and appearance, crawling in rather an awkward manner about its cage.

Taking everything into consideration, we must believe the bite of *Heloderma suspectum* to be a harmless one beyond the ordinary symptoms that usually follow the bite of any irritated animal. I have seen, as perhaps all surgeons have, the most serious consequences follow the bite inflicted by an angry man, and several years ago the writer had his hand confined in a sling for many weeks from such a wound administered by the teeth of a common cat, the even tenor of whose life had been suddenly interrupted.—*R. W. Shufeldt, M.D., U.S.A., 22d September, 1882.*

[NOTE ON THE PRECEDING PAPER BY THE EDITOR.—The question as to the venomous nature of *Heloderma* seems to be complicated by opposing testimony. The fissured teeth have long been known to herpetologists. Dr. J. G. Fischer, of Hamburg, has

recently described¹ the efferent ducts of the salivary glands which issue at the bases of the grooves of the teeth, evidently with the effect to carry the saliva into the wound. I observed this many years ago, but do not know whether I published it, and I gave the Arizona species the name of *suspectum* on account of the impression I derived from the observation of this fact. It is, however, true that even small animals do not always die from the effect of the bite. Perhaps the condition of Heloderma in this respect is like that of the Opisthoglyph serpents which have a similar arrangement of one or more of the posterior maxillary teeth, and are harmless to man at least.—*E. D. Cope.*

A LAND SHELL NEW TO THE UNITED STATES.—*Ampelita roxvelli* Newcomb can now be added to the fauna of the United States. The habitat of this species is given as Lower California in Binney and Bland, Part 1, and "has been accredited to Arizona, but not on undoubted authority" (see note 256, Binney's later work).

I now have specimens collected on the Salt River mountains, about seven miles south of Phoenix, Arizona, and determined from the type for me by Dr. Newcomb.—*Henry Prime.*

GAVARRET ON ASTIGMATISM (*Revue Scientifique* 15, Juillet, 1882).—Astigmatism is an anomaly of refraction of the eye caused by a difference in the refringent powers of its meridian. This may be caused by asymmetry of the curve of the cornea, (the most usual case) or of the crystalline lens, or of both. The variation may be regular or irregular. If a series of concentric black circles be placed in front of an astigmatic eye, the circles will appear, if the astigmatism be regular, as ellipses with their major axes in the meridian of the eye having the greatest radius of curve, but if the astigmatism be irregular, the margins of the circles will be irregular.

Regular astigmatism can be corrected by a suitable lens of spherical section or a combination of cylinder and sphere. The power of accommodation possessed by the crystalline lens interferes with a correct result. To obviate this atropine has been used, but this, besides other evils, may also give incorrect results, dependent upon the susceptibility of the patient.

The ophthalmometer of Helmholtz is an ingenious instrument for the measurement of this asymmetry, but the examination of a single eye needs eight readings of the instrument and long calculations.

A far simpler ophthalmometer has been invented by Drs. Saval and Schiötz. It depends upon the fact that, if the diseased eye be looked at through a lens of 10 to 20 centimetres focus, placed in a small hole pierced in the centre of a square of white paste-board, the image of the square, reflected by the eye examined, will be rectangular in proportion to the degree of the astigmatism.

¹ Verhandlungen des vereins für Naturwissenschaft, v, 1882, fol. III.

By using other shapes of pierced cardboard and employing a spy-glass with two objectives separated by a bi-refrangent prism, and provided with a graduated arc, the degree of astigmatism of the cornea can be calculated, but that of the crystalline can only be obtained by subtraction from the total astigmatism, which must be obtained by another and less precise method.

W. LECHE UPON THE MILK DENTITION AND HOMOLOGIES OF THE TEETH OF THE CHEIROPTERA.—The species the milk dentition of which was examined were *Vespertilio murinus* and *V. Daubentonii*; *Vesperugo Nathusii* and *V. noctula*; *Vesperus serotinus*, *V. borealis*, and *V. velatus*; *Plecotus auritus*, *Sturnira lilium*, and *Rhinolophus hipposideros*. In all the Vespertiliones the formula was: i. $\frac{2-2}{3-3}$, c. $\frac{1-1}{1-1}$, m. $\frac{2-2}{2-2}$; in *Sturnira* the third incisor of the lower jaw was wanting; while in *Rhinolophus* the only milk-teeth that could with certainty be found were: c. $\frac{1-1}{2-1}$, m. $\frac{2-2}{2-2}$.

In *Rhinolophus* the milk-teeth never break through the jaw; but remain concealed until their entire resorption.

In the other species the milk-teeth lie in more or less perfect alveoli upon the outer border of the jaws, outside and behind the developing permanent teeth. At a certain stage of development almost the entire set of milk-teeth can be found exterior to the nearly complete set of permanent ones, a singularity rendered possible by the small size and simple form of the permanent teeth. As many as 50 teeth may be found in nearly adult individuals. The milk-teeth have their crowns covered with enamel and always more or less three-lobed (the two outer lobes in some cases rudimentary), with the tips of the lobes hook-like and directed inwards and backwards. The root, always the greater portion of the entire length, is single, the second milk-incisor of *Plauritas* excepted.

The milk-teeth resemble each other greatly in each individual and throughout the tribe, instead of, as in other mammals, exhibiting characters similar to those of the second set. Our author considers, therefore, that both sets are typical, the first exhibiting the type of the homodont mammals, the second the higher type of the heterodont mammals. The permanent incisors are usually equal in number to the milk incisors, but in *Dysopes* they are $\frac{1-1}{1-1}$ against $\frac{2-2}{3-3}$; while in *Desmodus* the four upper milk-incisors are replaced by two enormous teeth which have not the remotest resemblance to their predecessors. From the position of the milk-molars with regard to the permanent ones, the following is the formula of the second. *Vespertilio* p.m. $\frac{3}{3}$ m. $\frac{3}{3}$; *Plecotus* p.m. $\frac{3}{3}$ m. $\frac{3}{3}$; *Vesperugo* p.m. $\frac{2}{2}$ m. $\frac{3}{3}$; *Vesperus* p.m. $\frac{1}{1}$ m. $\frac{3}{3}$; the reduction invariably taking place first in the upper jaw, instead of in the lower, as usual in mammals. In some other genera the molars also are reduced, exhibiting in the *Stenodermata* a series commencing with *Brachyphylla* and *Sturnira* with m. $\frac{3}{3}$, and ending with *Desmodus* with $\frac{1}{1}$.

EARLY STAGES OF THE CLAM.—In the report of J. B. Ferguson, Commissioner of Fisheries of Maryland, Mr. Ryder records his observations on the early stages of the clam (*Mya arenaria*). The spawning period of this mollusk lasts from the 10th of September to about the middle of October, or for about forty days. The sex of the adults, in a spawning condition may be ascertained by opening the shell carefully and removing a small portion of the richly colored yellow body-mass with a knife, scissors or forceps. These fragments traced out in a watch-glass with a few drops of sea water, allow a milky fluid to escape. Under a magnifying power of four or five times, the eggs of the female are visible in this milky fluid as very minute white points of nearly uniform size, very nearly 1-500th of an inch in diameter. The male cells or spermatozoa are visible under a power of 250 diameters. Mr. Ryder finds it possible after a little experience to observe with the naked eye the differences between the male fluid and the eggs. In two or three hours after artificial impregnation, *i.e.* by pouring water containing the male cells over the eggs, development begins. The changes which occur in the egg succeed each other with considerable rapidity, and, as in the development of the oyster, there are very well marked periods of active change of form which alternate with periods of repose, while there is a lateral symmetry which is just as well marked as in the oyster and unio. The development was followed as far as the formation of a gastrula, the process of which is the same as that of the oyster, and in a general way the process of segmentation of the egg of the clam appears to resemble, in its earliest stages, at least, the same process in Anodonta, as described by Flemming

ANATOMY OF THE OPHIURIDÆ.—Extensive observations upon the Ophiuridæ, carried on by M. Apostolides, at the laboratories of Banyuls and Roscoff, add considerably to our knowledge of the anatomy of that interesting group. The mouth does not open directly into the intestine, but into an œsophagus, provided with a sphincter, by which it can be opened or closed at the will of the animal. The so-called heart is in no sense a center of circulation, but is a glandular organ with an excretory canal. The vascular apparatus consists simply of a system of lacunary spaces. The body-cavity being completely closed, a perivisceral nutritive fluid circulates within it.

The genital clefts give access to ample closed sacs, carrying upon their exterior surface the genital sacs, but serving principally for respiration. The animal opens the clefts by the movement of its arms or of the muscles around the mouth, and the sacs are then filled by the action of the vibratory cilia of the inner layer. This takes place slowly, and when it is accomplished, the creature ceases to move, and the sacs drive out the water by their own elasticity. This movement of the respiratory sacs is believed to serve not only the purpose of permitting a gaseous exchange

with the nourishing fluid of the pervisceral cavity, but also to draw the blood from the arms into the peristomatic portion of that cavity, and force its return.

The blastosphere stage of the embryo is not followed by an invagination, as is usually supposed to be the case in all echinoderms, but by the delamination of the ectodermal cells to form the walls of the digestive cavity.

ZOOLOGICAL NOTES.—The publication of the Bulletin of the U. S. Geological and Geographical Survey of the Territories ends with the issue of No. 3 of vol. 6th. The contents are purely zoological. Mr. J. A. Allen publishes a preliminary list of the works and papers relating to the mammalian orders of Cete and Sirenia; unfortunately owing to the author's poor health, the article is incomplete, the bibliography being only brought down to the year 1840. Two papers on new moths and notes on other species by A. R. Grote close the number.—Apropos of whales, Professor G. O. Sars gives, in the *Forhandlingar i Videnskabs-Selskabet i Christiania*, for 1880, most excellent figures of *Megaptera boops*, $\frac{1}{3}$ nat. size; and of the finwhale, *Balænoptera musculus* $\frac{1}{3}$ nat. size; the sketches will be of standard value.—Professor Sars has also issued a well illustrated third part of his *Carcinological Contribution to the Norwegian fauna*, comprising his voluminous monograph of the Mysidæ.—The anatomy of the oyster, with two excellent figures, is described by Mr. Ryder in the last report of the Fish Commissioners of Maryland. How an oyster fattens, and the nature of its food and its mode and rate of growth, with figures, are given at length in Mr. Ryder's interesting report.—Professor Verrill gives, in the *Transactions of the Connecticut Academy of Sciences*, a historical sketch of New England Annelida, with annotated lists of the species hitherto recorded. Nine excellent plates accompany Part I.—Bulletin No. 11 of the U. S. National Museum is a very complete bibliography of the fishes of the Pacific coast of the United States to the end of 1879, by Dr. Theo. Gill.—M. Fischer recently gave before the Paris Academy of Sciences a *résumé* of his studies of the malacological fauna of the Mediterranean. The number of species obtained from all the deep dredgings (555 to 2660 metres) was about a hundred and twenty, every one of them common to the Mediterranean and the ocean.—M. Leopold Maggi, a disciple of Haeckel, in that he retains the sub-kingdom Protista for the reception of the lowest forms of life, shows that osmic acid will at once reveal the presence of protozoa in drinking water by causing their deposition at the bottom of the vessel. The micrographic analysis of the waters by this simple method may prove highly useful, since diarrhoea, dysentery, goitre, and other diseases are thought to depend on this protozoan life.—Herr Jickeli has discovered in Eudendrium and some other hydroids histological elements which seem to prove the existence of a nervous system.

—J. M. Velasco gives, in *La Naturaleza*, complete proofs of the transformation into *Amblystoma* of the axolotls of the lakes Xochimilco, Chalco and Zumpango, the last situated sixteen leagues north of Mexico. The transformed axolotls are well known in the localities round the lakes, and are called by various names which signify the absence of branchiæ, also by an Aztec word signifying terrestrial axolotl. The lake of Santa Isabel becomes dry every year. As the water lowers the axolotls commence to change, and continue a terrestrial life; but the axolotls of the other lakes which contain excellent water and an abundant vegetation, change also, and the transformed axolotls are common under stones or in humid places in the mountains south of Mexico.—Professor Hy. Ward, in the *Natural Science Bulletin*, gives some interesting particulars relating to the Apteryx. There are sixteen cervical vertebræ, short and strong, and resembling those of the moa; and eight dorsal vertebræ, the last anchylosed to the sacra, and bearing a small rib. The ribs, four of which are joined to the sternum, are broader and flatter than those of any other bird, differing greatly from the rounded ribs of the *Dinornis*. The pelvis resembles that of the emeu in its length, narrowness and flatness, while the legs are much like those of the *dinornis*, but have a comparatively longer femur.

ENTOMOLOGY.¹

THE BUCKEYE LEAF STEM BORER.—In our account of the proceedings of the entomological sub-section of the A. A. A. S., at the 1881 meeting (see *AMERICAN NATURALIST*, 1881, p. 1009), we gave a short abstract of Mr. E. W. Claypole's paper on the above insect, accepting the determination of the species as *Sericoris instrutana* and mentioning the fact that the work of *Proteoteras æsculana* Riley, upon maple and buckeye, was very similar. A letter recently received from Mr. Claypole, prior to sending his article to press, and some specimens which he had kindly submitted to us, permit of some corrections and definite statements. We have a single specimen in our collection, bred from a larva found feeding, in 1873, on the blossoms of buckeye, and identical with Mr. Claypole's specimens, which are in too poor condition for description or positive determination. With this material and with Mr. Claypole's observations and our own notes, the following facts are established:

1st.—We have *Proteoteras æsculana* boring in the terminal green twigs of both maple and buckeye, in Missouri, and often producing a swelling or pseudo-gall. Exceptionally it works in the leaf-stalk. It also feeds on the samara of maple, as we reared the moth in June, 1881, from larvæ infesting these winged seeds that had been collected by Mr. A. J. Wethersby, of Cincinnati, O.

¹ This department is edited by Professor C. V. RILEY, Washington, D. C., to whom communications, books for notice, etc., should be sent.